

CLAIMS

What is claimed is:

1. 1. A method for generating random numbers comprising:
 2. providing a liquid crystal cell containing a liquid crystal material between substrates, each substrate having a facing electrode;
 4. applying a potential difference across said electrodes;
 5. measuring at least one physical property of said liquid crystal material to generate a plurality of reading measurements; and
 7. setting bits based on said plurality of reading measurements to generate a sequence of random numbers.
1. 2. The method of claim 1, wherein said at least one physical property is selected from the group consisting of light absorbed by the liquid crystal, light transmitted by the liquid crystal, light reflected by the liquid crystal, and the amount of electric current traversing the liquid crystal.
1. 3. The method of claim 1, further comprising
 2. first measuring said at least one physical property to generate a baseline measurement;
 4. subsequently measuring said at least one physical property to generate a plurality of reading measurements; and
 6. setting said bits based on a comparison of said baseline measurement to said plurality of reading measurements.
1. 4. The method of claim 1, wherein said liquid crystal material comprises nematic liquid crystal.
1. 5. The method of claim 1, wherein said applying step causes the liquid crystal material to undergo a chaotic turbulent flow.
1. 6. The method of claim 1, wherein said at least one physical property comprises a plurality of light sources directing light toward said liquid crystal cell and a like

3 plurality of light detectors to measure properties of the light after impinging said
4 liquid crystal cell.

1 7. An apparatus for the generation of random numbers comprising:
2 a pair of opposed substrates containing a layer of liquid crystal therebetween
3 each said substrate having an electrode facing the other said substrates;
4 a power supply applying an electric potential across said electrodes to drive
5 said liquid crystal into a chaotic flow;
6 at least one device for measuring a physical property of said layer of liquid
7 crystal which generates physical property measurements after an electric potential
8 is applied; and
9 an interface in communication with said device for measuring a physical
10 property, wherein said interface digitizes said physical property measurements to
11 generate a random number.

1 8. The apparatus according to claim 7, further comprising:
2 a computer program connected to said interface, wherein said computer
3 program processes said digitized measurements into random numbers for use in
4 encrypting data.

1 9. The apparatus according to claim 7, wherein said layer of liquid crystal is a nematic
2 material.

1 10. A method of encrypting data comprising:
2 providing a liquid crystal cell responsive to an electrical stimulus;
3 applying an electrical stimulus to said liquid crystal cell;
4 measuring at least one physical property of said liquid crystal cell to generate
5 a baseline measurement;
6 setting a plurality of bits based on said baseline measurement so as to generate
7 a sequence of random numbers; and
8 using said sequence of random numbers to generate an encryption key.

1 11. The method according to claim 10, further comprising:

2 applying said encryption key to data transmitted by a computing device.

1 12. The method according to claim 10 further comprising

2 subsequently measuring the at least one physical property of said liquid crystal

3 cell to generate a plurality of reading measurements;

4 determining the difference between each of said reading measurements and the

5 baseline measurement; and

6 setting said plurality of bits based on differences between said plurality of

7 reading measurements and said baseline measurement to generate said sequence of

8 random numbers.

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